The Method of Radiospectroscopic Investigation of Local   32-10-25/32
Chemical Composition

processes of aging, deformation, or thermal treatment;
investigation of inter-layer formation due to diffusion
or other causes. In conclusion the hope is expressed that
this newly introduced method with a new apparatus may in
future find new possibilities of being used.
There are 8 figures, 1 table, and 3 references, 2 of which
are Slavic.

ASSOCIATION: Institute of Metallurgy imeni A.A. Baykov of the Academy of Sciences, USSR
(Institut metallurgii im. A. A. Baykova Akademii nauk SSSR)

AVAILABLE: Library of Congress

1. Minerals-Analysis   2. Polentiometers-Applications

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3(1),18(3)

SOV/20-123-2-12/50

AUTHORS: Yavnel', A. A., Borovskiy, I. B., Il'in, N. P., Marchukova, I. D.

TITLE: The Investigation of the Composition of the Phases of Meteoritic Iron by the Method of the Local X-Ray Spectrum Analysis (Izucheniye sostava faz meteoritnogo zheleza metodom lokal'nogo rentgenospektral'nogo analiza)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 2, pp 256-258 (USSR)

ABSTRACT: A short report is first given on earlier papers dealing with this subject and on the shortcomings of hitherto employed methods. The authors investigated the phase composition by the method of the X-ray spectrum analysis of the microvolumina. This method was developed a short time ago by I. B. Borovskiy. The object of investigation was the iron meteorite Chebankol found in 1938, which, according to analyses carried out by M. I. Dyakonova, contains 9.03 % Ni and 0.44 % Co. The continuous distribution of iron, nickel, and cobalt with recording of the concentration curves during passage through the "bars" of the α-phase and through the strips of the γ-phase was investigated. The authors determined the composition of the

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The Investigation of the Composition of the Phases   SOV/20-123-2-12/50
of Meteoritic Iron by the Method of the Local X-Ray Spectrum Analysis

phases by which a Widmannstätten (Vidmanshtet) structure is
formed. In the case of a fine-grained phase mixture the average
composition was determined. A diagram shows the typical result
obtained by the first measuring series. A conspicuous feature
is the distinctly marked boundary between the phases in form
of a "jump" of the content of all important components of the
alloy. All measurements distinctly showed an increase of the
nickel content and a decrease of the iron and cobalt content
extending from the center of the strip of the γ-phase in the
direction towards its edge, in which case the extremum value
is on the boundary itself. According to the above-mentioned
data the crystal was no longer heated after crystallization
to such an extent as might cause a change of the composition
and ratio of the phases on the boundary by which they are
divided (even if the entire system did not regain full
equilibrium). Both phases of the meteoritic iron are of in-
homogeneous composition in spite of exceedingly slow cooling
down, i.e. the system is not fully in equilibrium. The tem-
peratures corresponding to the results obtained differ among
one another by about 20 %. Causes that might possibly be

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The Investigation of the Composition of the Phases   SOV/20-123-2-12/50
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responsible for this non-agreement are mentioned. The data
obtained for the variation of nickel concentration might
indicate a decrease of the solubility limit of nickel in the
α-phase with an increase of the degree of cooling, beginning
from a certain temperature value. Also the measurements
carried out of the phase composition of such parts of the
plessite in which the strips of the γ-phase are subdivided
by narrow strips of the α-phase showed a similar distribution
of elements. There are 3 figures, 1 table, and 8 references,
1 of which is Soviet.

ASSOCIATION: Komitet po meteoritam Akademii nauk SSSR (Committee for
                Meteorites of the Academy of Sciences, USSR)
                Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
                (Institute for Metallurgy imeni A. A. Baykov of the Academy of
                Sciences, USSR)

Card 3/4

IL'IN, N.P., LOSEVA, L. Ye.

Some results of usin the X-ray spectrum method to study the
composition of microquantities of an alloy. Trudy Inst. met.
no.6:81-88 '60.   (MIRA 13:8)
        (Alloys--Metallography)   (Spectrum, X-ray)

IL'IN, N.P.

Universal X-ray spectrum apparatus "RSASh-3DS" for the investigation of the chemical composition of microquantities of a substance. Trudy Inst. met no.6:97-101 '60. (MIRA 13:8)
(X rays--Apparatus and supplies)

80893
S/048/60/024/04/03/009
B006/B017

5.5310
24.6300

AUTHOR: Il'in, N. P.

TITLE: A Universal X-Ray Spectrograph for Investigating the Composition of Microvolumes of Matter

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 4, pp. 367-370

TEXT: The present article is a reproduction of a lecture delivered at the 4th All-Union Conference on X-Ray Spectroscopy (Rostov-na-Donu, June 29 - July 6, 1959). To meet the demands made on X-ray spectrographs today, a new type, PCAШ-3ДC (RSASh-3DS), has been designed and constructed by using many parts of the old PCAШ-2 (RSASh-2) spectrograph. By means of this instrument, the elements from magnesium ($Z=12$) to uranium ($Z=92$) can be analyzed. 2-3 μ are sufficient for analysis; the mean sensitivity attains 0.1%. The electron optical system, all supply blocks, the recording column, and the vacuum system are the same as in the old instrument. The principle and the construction of the X-ray spectrograph itself are new. It operates according to the "reflection

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A Universal X-Ray Spectrograph for Investigat-
ing the Composition of Microvolumes of Matter

method" so that no X-rays are absorbed by the analyzer crystal. Instead
of one, three single crystals were used because of the long wavelength
interval: a quartz crystal, lattice constant $d = 1.147$ Å with the plane
of reflection (13$\overline{4}$0) for the range 0.7-1.5 Å, a quartz crystal with
$d = 4.245$ Å, and the plane of reflection (10$\overline{1}$0) for the range 1.4-5.4 Å,
and for the range up to 10 Å a mica crystal with $d = 9.928$ Å, plane of
reflection (001). With these three crystals the X-ray spectrum can be
analyzed according to the K- and L-series. With this spectrograph the
vacuum problem is solved by a novel type of construction. The vacuum is
maintained by a system of metallic bellows. A Geiger-end counter serves
for recording radiation. Details of construction of the individual parts
of the spectrograph are discussed. Fig. 1 shows a schematical representa-
tion of the entire apparatus; a micro-focus X-ray tube serves as radiation
source. Fig. 2 shows a total view of the apparatus (photograph). Also a
second ray can be taken from the X-ray tube, after which it is sent into
an attachment which operates according to Du Monde's "penetration"
method (crystal K_2 and counter O_2 in Fig. 1). Thus, the range 0.7-2.0 Å
is covered, i.e., about forty heavy elements can be analyzed.

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A Universal X-Ray Spectrograph for Investigat-   S/048/60/024/04/03/009
ing the Composition of Microvolumes of Matter   B006/B017

There are 2 figures and 4 Soviet references.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A. A. Baykov of the
Academy of Sciences, USSR)

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S/260/62/000/007/004/004
I006/I206

AUTHOR: Bagdassarov, H. S, Dobrzhanskiy, G. F., and Il'in, N. P.

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk. Pribory tochnoy, mekhaniki i ispytatel'nyye
               ustanovki, v. 7, 1962, 26, abstract 40.7.167. In collection "Rost. krystallov. v. 3.",
               M., AN SSSR, 1961, 254–257. Discussion, 501–502.

TEXT: An experimental model of an installation is described, in which provision is made for crystallization by any applicable method for crystallization out of fused substance. The change from one method
of crystallization to another is effected without any changes of the apparatus. Crystal growth by the proposed
installation can be performed as well in vacuo up to 10^{-5} mm Hg, as in a gas atmosphere at a pressure
up to 2 atm. The installation uses either induction heating, or heating by electrical resistance heater. By the
use of high frequency heating in vacuo temperatures of 2500–3000°, can be obtained, while in a gas atmossphere—of the order of 2000°C. There are 2 figures and 7 references.

[Abstracter's note: Complete translation.]

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AUTHOR: Il'in, N. P.

TITLE: Possibility of quantitative X-ray spectrum analysis without standards

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 8, 1961, 929-932

TEXT: The present paper was the subject of a lecture delivered at the 5th Conference on X-ray Spectroscopy at Khar'kov from January 30 to February 4, 1961. The use of ionization methods for recording the intensity of X-ray lines increases the sensitivity and the accuracy of quantitative X-ray spectrum analyses. Calculation of the concentration from the measured line intensity is, however, an additional source of errors. The author attempted to give general rules governing the dependence of the X-ray line intensity on the composition. Furthermore, he attempted to find a simple correction function which can be calculated by using empirical parameters and table values. Fig. 1 shows a typical dependence of the intensity of an analysis line on the composition of

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some standard samples. The following conclusions could be drawn from the experimental data: 1) The majority of the points lies below the straight line $I_c / I_\vartheta = C_i$ (I_o - intensity of the sample; I_9 - intensity of the standard) with the deviation from the straight line being the greater, the higher the absorption coefficient of the corresponding line in the other component. 2) The points of those elements excited by radiation of secondary components lie above this straight line. 3) The effect of strongly differing components (Au-Cu, Mo-Be) is lower than that of selective absorption and excitation of an emission. Hence, the correction function should take account of the self-absorption in the test piece and fluorescence excitation. The above relation can be written as follows: $I_{c_i}/I_{\vartheta_i} = C_i f(\mu, A, \delta_{fl})$. Here μ are the self-absorption of radiation by the test piece, δ_{fl} is the fluorescence excitation, and A takes account of the different penetration depth of the electrons as depending on the anode material. For the two-component system Ni-Fe the author first calculates the correction for self-absorption. He introduces an "effective" density of the absorbing layer d_{eff} such that $\exp(-\mu d_{eff})$ gives the weakening of

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Possibility of quantitative X-ray ...   B104/B202

the analysis lines in the working volume of the anode.

$$f_1(\mu) = e^{-\left[(a_{Ni}c_{Ni}+a_{Fe}c_{Fe})\left(\frac{c_{Ni}}{\rho_{Ni}}+\frac{c_{Fe}}{\rho_{Fe}}\right) \cdot \rho_{Ni}d_{Ni}-\rho_{Ni}d_{Ni}\right]} = 0.34; \qquad (2)$$

is found for the correction function, where $d_{Ni} = 3 \cdot 10^{-4}$ cm was determined
experimentally. For the system Fe-Ni (83% Fe) the following expression
is given for the estimation of the correction for the fluorescence
excitation of the atoms of one element by irradiation of the other one:
$\xi_{fl} = \beta_{Ni-Fe}a_{Fe}a_{Ni}$ where a_{Fe} and a_{Ni} are the atomic concentrations of the
components and β_{Ni-Fe} is a constant for the system concerned, called the
"fluorescence factor". The following expression is obtained: β_{Ni-Fe}
$= 2.7 \cdot 10^{-3}$. It is demonstrated that β_{Ni-Fe} depends on 1) the number of
quanta of Ni emission absorbed by the iron atoms. It is characterized by
the mass absorption coefficient, $\tau_{NiK_\alpha}^{Fe}$; 2) on the intensity of Ni
radiation; 3) on the efficiency of fluorescence. Using $\beta_{Ni-Fe}=\beta_0=2.7 \cdot 10^{-3}$

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an empirical formula for calculating the fluorescence coefficient for any system A – B of elements is obtained:

$$\beta_{A-B} = \beta_{Ni-Fe} \frac{\tau_B}{\tau_{Ni}} \cdot \frac{I_A}{I_{Ni}} \cdot \frac{W_B}{W_{Fe}} \qquad (5)$$

$I_{A,Ni}$ are the corresponding intensities, $W_{B,Fe}$ the efficiency of fluorescence and $\tau_{B,Ni}$ the mass absorption coefficients. The absolute increase of the line intensity of the element B due to fluorescence is determined from: $\delta_{fl}^{B} = \beta_{A-B} a_A a_B$. Using the last two formulas the author calculates the intensity ratios I_o/I_9 with good agreement being obtained with the experimental values. There are 3 figures and 2 references: 1 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut metallurgii im. A.A. Baykova Akademii nauk SSSR
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of Sciences USSR)

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35769
S/180/62/000/001/005/014
E032/E314

/.Y3₀₀

AUTHORS: Yerokhin, A.A. and Il'in, N.P.   (Moscow)

TITLE: Distribution of elements in a drop formed on the
electrode tip during arc-welding

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye
tekhnicheskikh nauk. Metallurgiya i toplivo,
no. 1, 1962, 81 - 83

TEXT: The authors investigated the distribution of Fe, Ni,
Mn and Cr on the longitudinal sections of drops fixed at the
electrode tip. Three specimens were used as follows:
specimen 1 was obtained by melting an electrode of a high-alloy
wire Св-Х 25H20 (Sv-Kh25N20) covered with a highly oxidizing
coating (hematite and sodium silicate). During welding,
chromium, manganese and other elements present in the electrode
rod were oxidized and iron was reduced from the ferric slag.
Specimens 2 and 3 were obtained by melting electrodes of an
unalloyed wire, grade Св-08A (Sv-08A) covered with coatings
containing ferromanganese (specimen 2) and ferrochromium
(specimen 3). In these specimens one expected to observe the

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Distribution of elements ....

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transfer of manganese and chromium from the coatings into the drop and further into the deposited metal. Metallographic sections were prepared from the drops and the wire of the above specimens in a longitudinal direction. The distribution of the elements in the drop was investigated using an X-ray spectrographic method of chemical analysis of micro-regions (2 - 3 μ in diameter). The intensity of characteristic $K_{\alpha 1}$ radiation was determined for iron, chromium, manganese and nickel at various points along the drop and the wire in the longitudinal and radial direction. The unmelted part of the electrode wire served as a standard for comparison. Examination of specimen 1 showed that the bulk of the drop was practically homogeneous with regard to chemical composition, both in the axial and radial directions. However, the composition of the drop differs considerably from that of the wire: the manganese content of the drop decreased nearly five times and the chromium content decreased 1.5 times, whereas the iron and nickel contents increased 1.2 and 1.1 times, respectively. The sudden change of composition between the bulk masses of the drop and the wire (electrode rod) is

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Distribution of elements S/180/62/000/001/005/014
                                  E032/E314

located in a narrow zone adjacent to the unmelted part of the
electrode rod. This transition zone extends approximately
300 - 400 μ along the electrode axis and since the drop is
4 - 5 mm long, the above zone occupies no more than 10% of the
drop length. Similar examination of microcomposition in
specimens 2 and 3 showed also a homogeneous distribution of
elements in the drop, in spite of the fact that during melting
the drop was considerably (up to 10%) enriched with manganese
or chromium. The transition of concentration occurred in the
region of 200 - 250 μ. The results of the present work have not
confirmed previously published data. Convective diffusion in
the drop produces good intermixing of the metal. Nevertheless,
there should be some concentration gradient in the drop in the
direction of the diffusion currents and this also applies to the
axis of the drop. The absence of a concentration gradient can
be explained by equalization of the composition of the drop,
while it cools down after the arc is broken. High-speed cinemato-
graphy studies have shown that this cooling time is sufficiently
long compared with the life of the drop on the electrode tip

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during melting. The narrow zone in which an abrupt change in
the chemical composition was detected adjacent to the unmelted
electrode rod shows that in this region the overheating is small
and the cooling rate of the metal high. However, in the remaining
part of the drop convective diffusion brings about almost
complete homogenization of the metal. Some gradient of concen-
tration and temperature exists in the direction of the diffusion
currents in the molten drop. There are 3 figures.

SUBMITTED: August 22, 1961

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BOROVSKIY, I.B.; IL'IN, N.P.; LOSEVA, L.Ye.

Investigating interdiffusion in the system Cu - Au. Trudy Inst.
met. no.15:32-40 '63.   (MIRA 16:9)
    (Copper-gold alloys—Metallography) (Diffusion)

ACC NR: AP6028190   SOURCE CODE: UR/0032/66/032/006/0687/0693

AUTHOR: Il'in, N. P.; Kakhana, M. M.; Fedorov, O. P.

ORG: Institute of Geochemistry and Analytical Chemistry im. V. I. Vernadskiy AN SSSR (Institut geokhimii i analiticheskoy khimii, AN SSSR)

TITLE: Sensitivity of x ray spectral analysis and selection of optimum conditions for recording spectra

SOURCE: Zavodskaya laboratoriya, v. 32, no. 6, 1966, 687-693

TOPIC TAGS: spectrum analysis, x ray analysis, mathematic analysis

ABSTRACT: The article describes an attempt to establish the optimum dimensions of the aperture of an amplitude analyzer, at which there will be achieved the maximum possible analytical sensitivity. The article is a mathematical treatment of the problem, based on experimental data. The first section is a mathematical development of the basic relationships determining the sensitivity. The authors then pass on to a choice of the optimum width of the channel of the pulses being recorded. Under this section, two methods are considered: the crystal diffraction method, and the non-dispersion method (non-crystal). The final section is a statistical evaluation of the optimum sensitivity. It concludes with a series of curves which make it possible to evaluate the loss of sensitivity when operating with non-optimum dimensions of the aperture of the recording spectrometer. Orig. art. has: 6 formulas, 3 figures, and 2 tables.

SUB CODE: 11, 20/ SUBM DATE: none/ ORIG REF: 006/ OTH REF: 001   UDC: 543.422.8

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IL'IN, N.S.

CO

30

Varnish for vulcanized molded rubber products. N. S.
Il'in and O. N. Burkova. J. Rubber Ind. (U. S. S. R.) 12,
463-9 (1935).—Elaborate expts. were carried out to find a
formula of "cold" varnish with an oil base. A satisfac-
tory formula was not found.   A. Pestoff

ILIN, N. [S.]

CP

30

Drying of lacquers on rubber. N. Il'in, O. Sarkova and N. Philonskaya. *J. Rubber Ind.* (U. S. S. R.) 1936, 294 8.—Samples of rubber contg. different ingredients were vulcanized in a press, lacquered with different lacquers, dried at 70° and the rates of drying studied. With reclaimed rubber, Kubheras, mercaptobenzothiazole + tetramethylthiuram disulfide, C black, S and synthetic rubber the rates of drying were relatively rapid. Pine tar, paraffin oil, Neozone and akhol retarded the rate of drying. CaCO₃ had no influence.   A. Pestoff

METALLURGICAL LITERATURE CLASSIFICATION

ILIN, N.S

30

Decreasing the time of vulcanization and improving the quality of galoshes. N. S. Il'in, I. A. Shokhin and N. A. Ravdio. *Caoutchouc and Rubber* (U. S. S. R.) 1930, No. 11, 39-41; *Khim. Referat. Zhur.* 1940, No. 5, 118.—The increases in temp. in various parts of a galosh being vulcanized were detd. by means of thermocouples placed at various points in the galoshes. The outside rubber is vulcanized at 130° for 12 min. The inner parts of the galoshes reach the temp. necessary for vulcanization only during the last 3 min. This time is insufficient for complete vulcanization with mercaptobenzothiazole and thiuram accelerators. A method was developed for vulcanizing the inner fabric mixts. with accelerators K-43 and K-45 at low temps. (120°). After a 3-min. vulcanization at 120° the rubber mixt. with K-45 accelerator was well vulcanized. The method reduces the vulcanization time for galoshes from 12 to 6 min.   W. R. Hern

IL'IN, N.S.

PROCESSES AND PROPERTIES INDEX

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Lacquers.   P. I. Nazarov, N. S. Il'in, P. V. Sirob-Srulev
and N. L. Nikel'mant.   Russ. 67,228, June 30, 1948.
sulfurized vegetable oils or fish oils, resin esters, pigments
and solvents are added   waste products of vulcanized
rubber previously treated for 1-10 hrs. at 200-200° with
salts of naphthenic or fatty acids, or with products ob-
tained in the oxidation of petroleum bottoms.

METALLURGICAL LITERATURE CLASSIFICATION

SOV/138-58-10-6/10

AUTHORS: Gul', V. Ye.; Vil'nits, S. A; Gel'perin, N. I; Il'in, N.S;
Kaplunov, Ya. N; Tsarskiy,L. N. and Krasikova, G. Z.

TITLE: Investigation of the Possibility of Pulverizing Chilled
Rubber (Razrabotka sposoba izmel'cheniya okhlazhdennykh
rezin)

PERIODICAL: Kauchuk i Rezina, 1958, Nr 10, pp 22 - 28 (USSR)

ABSTRACT: Much rubber scrap is not re-used because of the difficul-
ty of pulverizing the material. This difficulty can be
overcome by chilling the rubber. The authors first
review the changes in physical and mechanical properties
of rubber at low temperature. Fig.1 shows maximum speed
of rupture (mm/sec) against temperature for a vulcanized
mixture of SKB and natural rubber. Fig.2 shows the same
for SKB (Butyl) rubber. Each figure shows curves for
three different rates of deformation. The maximum speed
of rupture is that which occurs immediately before the
specimen parts. The re-orientation of material at the
point where rupture commences was studied by scribing a
line across the specimens, and comparing the thickness
of the line where rupture commences with the thickness
of the line in the unruptured part of the stretched
specimen. In Fig.4 these relative thicknesses are plot-

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Investigation of the Possibility of Pulverizing Chilled Rubber

ted against time for specimens of SKB and natural rubber at four different temperatures. The specimens were deformed at a rate of 500 mm/min. At -53°C no re-orientation at the rupture point occurs. Fig.5 shows stress versus relative elongation for the same rubber mix at different temperatures. Fig.6a shows the relative elongation versus temperature, and Fig.6b the stress versus temperature at the moment of rupture, in each case for three different rates of deformation. In Fig.7 the work of deformation (kg/cm^3) is plotted against temperature for SKB-50 and the same in Fig.8 for SKB-50 plus natural rubber. By comparing Figs. 2, 6 and 7 one sees that the temperature for maximum work of deformation to rupture corresponds to that for minimum speed of rupture and for maximum relative elongation at rupture. At low temperatures the low mobility of the molecular structure prevents re-orientation at the point of rupture as is seen in Fig.4; the resistance to rupture and relative elongation decrease and the speed of rupture increases. Fig.9 shows stress versus relative elongation for samples of rubber and fabric, cut from a tyre casing, at three different rates of deformation for four temperatures. These follow

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Investigation of the Possibility of Pulverizing Chilled Rubber

the same form as the plain rubber specimens in Fig.5.
In order to obtain a brittle state when pulverizing
rubber and fabric materials the temperature must be
lowered and the speed of pulverization or rupture must
be increased. The apparatus shown in Fig.10 was con-
structed to determine optimum speed of deformation for
pulverization. Specimens 10 - 20 mm wide and 1 - 6 mm
thick are clamped to the periphery of a 200 mm disc
which can be rotated at various speeds. The disc runs
in an insulated tank. The specimens strike against a
pin mounted on a spring, so that the force acting on the
pin can be measured dynamometrically, and the energy of
deformation in fracturing the specimens can be calculated.
Optimum speed was found to be in the region of 3000 r.p.m.
From the parameters established, the hammer-mill type of
pulverizer, shown in Fig.11, was constructed. The gap
between the hammers and the saw-toothed periphery of the
mill casing is 1.5 - 2 mm. The mill runs at 3000 r.p.m.
The mill is fed with pieces of rubber about 40 x 20 x 8 mm
previously cooled in a dry ice and alcohol mixture. Pul-
verized material discharged through the grating at the

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Investigation of the Possibility of Pulverizing Chilled Rubber

base of the mill was subjected to sieve analysis. Energy input was measured by a recording wattmeter. Table 1 shows results with this pulverizer for various rubber and rubber fabric materials. The size of the openings in the discharge grating was either 5 mm or 2 mm. Material was cooled to temperatures of $-66°$, $-60°$ and $-50°C$. Time and k.w.h. to pulverize 400 gramme quantities of material are given, and the specific energy requirement in k.w.h. per metric ton of material is given in the last column. Table 2 gives the sieve analysis for the various samples for 5 mm and for 2 mm openings in the discharge grating. To complete the calculation for energy requirements, the power in k.w.h. required to cool one ton of material to temperatures between $5°C$ and $-55°C$ are given. These calculations are based on an initial temperature of $20°C$., specific heat of material 0.5 c.cal/kg$°C$, and 59.5% cooling efficiency from a Freon 12-refrigeration circuit as

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Investigation of the Possibility of Pulverizing Chilled Rubber.

in Fig.12 with a further 20% loss to air allowed for.
There are 12 Figures, 2 Tables and 7 Soviet References

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii
im. M. V. Lomonosova (Moscow Institute of Precision
Chemical Technology imeni M.V. Lomonosov)

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SOV/138-59-2-13/24

AUTHOR: Il'in, N. S.

TITLE: Bonding Rubber to Solid Material with Type 201 Adhesive (Krepleniye rezin k tverdym podkladkam pri pomoshchi kleya 201)

PERIODICAL: Kauchuk i rezina, 1959, Nr 2, pp 44-47 (USSR)

ABSTRACT: Type 201 adhesive is a solution of a composition containing chlorinated high polymers which give the adhesive a polar characteristic. It has found extensive use in binding rubber to metal rollers for escalators, for textile machinery, shock absorbers etc. The adhesive is applied to cleaned, degreased metal surfaces and 20 to 30 minutes open assembly time is allowed for solvent evaporation at room temperature. The (unvulcanized) rubber mix is then put onto the dried adhesive film and the assembly vulcanized in a mould under pressure, or in direct contact with steam or hot air in an autoclave without a mould at normal optimum vulcanizing conditions. The bond strength is not affected by moisture during application or air drying. Metals, being non-polar in character, can be made polar if an electrical charge is brought near to their surface. The adhesive, in this

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Bonding Rubber to Solid Material with Type 201 Adhesive

case, carries such a charge. In the final stages of solvent evaporation, while the adhesive molecules are still free to move, the electrical field arising at the interface orientates the molecules as they approach the metal surface. On full evaporation of the solvent the adhesive layer is held by physical "residual" valency, hydrogen bond, forces of physical nature, to the metal surface in a fully orientated state. Synthetic rubbers, in general, have a polar nature compatible with the polar adhesive layer; natural rubber, oxidized to a certain degree after mixing and plastication, has a lower degree of polarity. Vulcanization caused further polarization. Fillers vary in polarity; chalk is weakly polar, channel black is highly polar. Tests were made with natural and with polychloroprene rubbers filled with varying amounts of chalk or channel black. Bonded rubber to metal specimens were vulcanized at $143^\circ C$ for 50 to 70 minutes under 50 kg/cm^2 pressure. The results of stripping tests are given in Table 1 for natural rubber, and Table II for polychloroprene rubber. The

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SOV/138-59-2-13/24

Bonding Rubber to Solid Material with Type 201 Adhesive

natural rubber specimens filled with chalk (specimens 1 to 7) show poor bond strength. Those filled with channel black (specimens 8 to 14) show increasingly good bond strength as channel black content is increased to the theoretical maximum of 40 parts per 100 parts of rubber, where the rubber should form a monomolecular layer on the surface of the channel black, with a thickness of the same dimensions as the distance separating the filler particles from the adhesive layer. This distance does not present any obstacle to the formation of interactions between the two polar materials, i.e. the channel black and the adhesive layer. The chloroprene rubber exhibits good bond strength even without filler (specimen 15, Table II), which confirms the polar nature of this synthetic rubber. Addition of filler has a supplementary effect, leading to high bond strengths with either 30 parts per hundred of chalk, or of channel black. The first five (horizontal) columns in the tables relate to the physical and mechanical properties of the rubber mixes, Card 3/4 the final bottom line states the bond strength between rubber and metal in kg/cm^2.

SOV/138-59-2-13/24

Bonding Rubber to Solid Material with Type 201 Adhesive

There are 2 tables and 7 references, 3 of which are Soviet, 4 English.

Card 4/4

5(1,3)

SOV/153-2-2-25/31

AUTHORS: Gul', V. Ye., Mayzel', N. S., Frenkel', S. N., Il'in, N. S., Kaplunov, Ya. N., Khmunin, S. F., Voronkov, Yu. P.

TITLE: Examination of the Use of High-molecular Substances for the Isolation of Current Conducting Rails (Issledovaniye primeneniya vysokomolekulyarnykh veshchestv dlya izolyatsii shin tokoprovodov)

ABSTRACT: A number of demands is made on the isolation mentioned in the title, which could not be satisfied for a long time. In most cases a material perfect in every way proved to be unsatisfactory with regard to one single characteristic, so that the rails mentioned in the title could not be isolated. A uniform point-of-view concerning the electric break-down of high-molecular compounds is lacking at present. The authors presume that the electric field strength at which a high-molecular compound breaks down, is mainly determined by peculiarities of the chemical structure of the macro-molecules, further by the structure of the material

Card 1/3

Examination of the Use of High-molecular Substances   SOV/153-2-2-25/31
for the Isolation of Current Conducting Rails

based upon a high-molecular compound, as well as by a num-
ber of external factors which are connected with the
application of the relevant. products. By confronting the
values of a total polarization (electronic, ionic, and
structural), it is possible to estimate the suitability of .
a material with a certain chemical composition. The struc-
tural polarization, first established by P. P. Kobeko, is
characteristic of caoutchouc and caoutchouc-like materials.
The purpose of the present paper is an attempt to use high-
molecular materials of such composition and mode of applica-
tion which meet all demands for isolating the rail surface.
Butyl-caoutchouc, butadiene-styrene-caoutchouc, silicon-
caoutchouc, polyamide-resin 548, polyvinyl-butyral, poly-
tetrafluoro-ethylene (fluoroplast), and polyethylene were
used. A device was set up for testing the resistance to
electric breakdown. All requirements of GOST-864-41 were
satisfied during the tests. Only the test voltage was in-
creased to 3,500-5,000 v instead of 2,000 v. First of all
the m e t h o d s o f a p p l i c a t i o n o f t h e

Card 2/3   i s o l a t i o n - c o a t i n g t o t h e s a m p l e

Examination of the Use of High-molecular Substances   SOV/153-2-2-25/31
for the Isolation of Current Conducting Rails

were discussed. All types of coatings were tested for heat-,
frost-, light-, and ozone-resistance, and for vibration.
Tables 1 and 2 show that the isolation on the basis of
polymer substances, applied in molten state on a heated
metal surface, differs from other isolation methods with
polymers of increased electric strength. The authors
propose a rational method of isolation for the conductor-
rail, that is the application of molten and sprayed poly-
ethylene particles on a heated rail surface. There are 2
tables.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni
               M. V. Lomonosova; Kafedra fiziki (Moscow Institute for
               Fine Chemical Technology imeni M. V. Lomonosov; Chair of
               Physics)

SUBMITTED: December 16, 1957

Card 3/3

84294

15.9300   2109 1526 1474

S/138/60/000/005/006/012
A051/A029

AUTHORS: Nusinov, M.D., Pozin, A.A., Ospovat, R.I., Il'in, N.S.

TITLE: On the Relationship Between the Filling of a CKB (SKB)-Based Rubber Mixture and its Elastic-Viscous Characteristics

PERIODICAL: Kauchuk i Rezina, 1960, No. 5, pp. 21 - 23

TEXT: Carbon black and the softener have the greatest effect on the elastic-viscous characteristics of a rubber mixture due to the higher specific gravity in the volumetric or weight content of the mixture. It was shown (Refs. 1 and 2) that an increase in the degree of filling of the rubber mixture with carbon black decreases the plastic properties of the mixture, and an increase in the softener content leads to an increase in these properties. The changes of each characteristic at different degrees of filling with carbon black and softeners are observed. The behavior of the mixtures in deformations can be predicted based on the data of the changes. The laboratory method for the observations is described (Ref. 4). The total deformation obtained in the testing can be divided into elastic and viscous components, from which the elastic or the viscous properties

Card 1/3

84294

S/138/60/000/005/006/012
A051/A029

On the Relationship Between the Filling of a CKБ(SKB)-Based Rubber Mixture and its Elastic-Viscous Characteristics

can be determined (Ref. 5). Figure 1 is the graphical outline of the experiment. The formulae which were used for the computations are given (Formulae 1 - 7). A highly-filled commercial mixture with a SKB-60 base was chosen as the object of the investigation. As a result of the experimental data obtained several conclusions were drawn: with an increase in the carbon black dosage the characteristic indices increase and with an increase in the softener dosage they decrease. The intensity of the change of the various characteristics varies with an increase in the degree of filling in the mixtures. The plastic viscosity η_2 and the standard of instantaneous elasticity G_2 change most significantly. Both are associated with the intermolecular interaction. The characteristics of the lagging elastic deformation change only slightly in this case. Since the lagging elastic deformation is determined mostly by the elastic properties of the rubber molecule and the individual links and an increase in the degree of filling does not change the rubber substance itself, the value of the characteristic of the lagging elastic deformation changes with it. This fact can be utilized in developing a new method of high-speed control of

Card 2/3

84294

S/138/60/000/005/006/012
A051/A029

On the Relationship Between the Filling of a CKБ(SKB)-Based Rubber Mixture
and its Elastic-Viscous Characteristics

the technological properties under industrial conditions, viz. the control
of the G2 standard by ultrasound. On the other hand, with an increase in
the degree of the filling with active gaseous carbon black, the standard
increases significantly, and the viscosity of the lagging elasticity in-
creases correspondingly. Similar results were obtained for rubber mixtures
based on various rubbers (Refs. 7 and 8). In this case the presence of an
interaction (in the non-vulcanized state) between the filler and the rubber
substance is assumed, which leads to an increase in the numeric values of
the characteristics of "high-elastic" deformation. There are 4 sets of
figures and 8 references: 6 Soviet, 1 English and 1 German.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovykhi lateksnykh iz-
              deliy i Moskovskiy institut tonkoy khimicheskoy tekhnologii
              im. M.V. Lomonosova (Scientific Research Institute of Rubber
              and Latex Products and the Moscow Institute of Fine Chemical
              Technology imeni M.V. Lomonosov)

Card 3/3

40296.

S/081/62/000/014/031/039
B166/B144

15.9410

AUTHORS: Koshelev, F. F., Il'in, N. S., Glagolev, V. A.

TITLE: Bonding rubbers to steel with chloronairite-base adhesives

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 14, 1962, 650, abstract
              14P352 (Vestn. tekhn. i ekon. inform. N.-i. in-t tekhn.-ekon.
              issléd. Gos. kom-ta Sov. Min. SSSR po khimii, no. 9, 1961,
              56 - 60)

TEXT: The bonding strength with steel (BS; ГОСТ 209-41 (GOST 209-41)) was
determined for rubbers made from HK (NK), and for butadiene-styrene and
butadiene-nitrile rubbers and nairite, bonded with an adhesive (20% solu-
tion) based on chloronairite (CN) containing 64% Cl. The Cl ions were
washed out and the surface of the steel was first cleaned with emery
paper. Adhesive made from CN has high adhesion to steel and to polar
rubbers but very low BS with nonpolar rubbers. In order to increase the
BS on the adhesive - rubber interface it is recommended that the following
additions be made to CN adhesive: (1) rubbers which covulcanize with
the rubber being bonded to the steel (for example, carboxyl-containing
butadiene-styrene rubbers with 1-1.5% methacrylic acid); (2) active fillers
Card 1/2

S/081/62/000/014/031/039
B156/B144

Bonding rubbers to steel...

(for example, channel black); (3) compounds of the amine class (for example, polyethylene polyamine or hexamethylene diamine); (4) synthetic resins which combine with CN and which have good adhesive properties (for example, resorcinol formaldehyde resins). In some cases it is recommended that several components be added at once. Joints made with these adhesives have good heat resistance. [Abstracter's note: Complete translation.]

Card 2/2

IL'IN, N.S

S/138/62/000/001/009/009
A051/A126

AUTHORS: Koshelev, F.F.; Il'yin, N.S.; Glagolev, V.A.

TITLE: Production of adhesives on laboratory scale

PERIODICAL: Kauchuk i rezina, no. 1, 1962, 54

TEXT: A method has been developed for producing adhesives in quantities of 150 - 500 g, for studying their properties in the laboratory. An instrument for grinding fabric, manufactured at the Kiyev Plant of Medical Appliances, was used (Fig. 1). Dissolution takes place in the glass container (3), with knives having cutting and mixing blades and rotating at a speed of 4,000 or 8,000 rpm. The compression rubber-metal collar and rubber linings of the head (2) were re- placed in the plant instrument by a rubber collar and linings, made of oil-ben- zine-resistant rubber, manufactured at the "Kauchuk" Plant. The preparation of the solution takes about 10 - 20 min, depending on the type of rubber or the rubber mix composition. The described instrument can be used to produce adhe- sives containing 60 - 100% by weight of active filters, up to 100 w.p. of rubber, and also viscose rubber solutions. The head and blades must be disassembled periodically for cleaning and lubricating of the rotary parts. There are 2 fig- ures.

Card 1/2

Production of adhesives on laboratory scale

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologi im. M.V. Lomo-
nosova (Moscow Institute of Fine Chemical Technology im. M.V. Lomo-
nosov)

Figure 1: Diagram of the instrument for fabric
grinding. 1 - body of the instrument; 2 - head;
3 - glass container; 4 - cover; 5 - knives;
6 - electrical switch; 7 - clutch with a square
top; 8 - electric safety device.
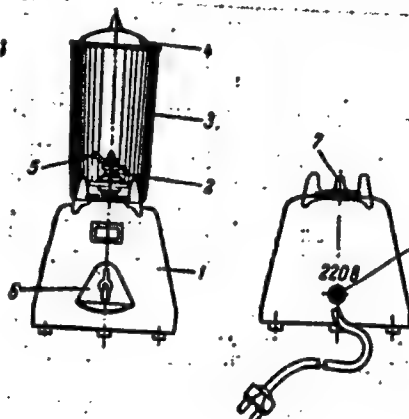
Card 2/2

ASSOCIATION: none

IL'IN, N.S.

Introducing vacuum treatment of aluminum alloys. Biul. tekh.-
ekon. inform. Gos. nauch.-issl. inst. nauch. i tekh. inform.
18 no. 12:3-4 D '65

(MIRA 19:1)

ACC NR: AP6005281   JD/WW/JW/JXT(CZ)
                              SOURCE CODE: UR/0413/66/000/001/0023/0023

INVENTOR: Rodina, A. A., Doronicheva, N. I.; Il'in, N. S.;
Khromchenko, Ye. P.   38
                                                                 B
ORG: none

TITLE: Device for the fine purification of hydrogen. Class 12,
No. 177414. [announced by the State Scientific Research and Planning
Institute for the Rear-Metal Industry (Gosudarstvennyy nauchno-
issledovatel'skiy i proyektnyy institut redkometallicheskoy
promyshlennosti)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki,
no. 1, 1966, 23

TOPIC TAGS: hydrogen, hydrogen purification, hydrogen filter

ABSTRACT: An Author Certificate has been issued describing a hydrogen-
refining purification device containing a filter diaphragm made of
metals or alloys possessing selective penetrability for hydrogen. To
prevent the penetration of impurities from technical-grade hydrogen
into pure hydrogen through leaks in the filter diaphragm and to make
possible the rapid detection of such impurities, the filter diaphragm
is built into an air-tight housing maintained under vacuum (see Fig. 1).

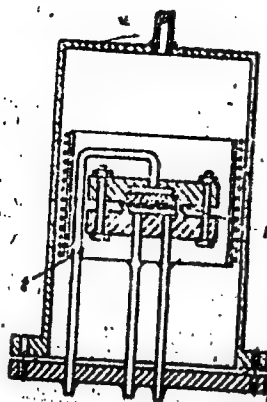Card 1/2   UDC: 66.067.23 - 661.965

ACC NR: AP6005281

Fig. 1. Device for fine purifica-
tion of hydrogen. 1 - filter
diaphragm; 2 - air-tight housing.

SUB CODE: 13/   SUBM DATE: 11Mar64/

Card 2/2   BLG

L 26690-66   EWT(m)/EWP(t)   IJP(c)   JH/JD

ACC NR: AP6016903

SOURCE CODE: UR/0193/65/000/012/0003/0005

AUTHOR: Il'in, N. S.

ORG: none

TITLE: Vacuum refining of aluminum alloys

SOURCE: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 12, 1965, 3-4

TOPIC TAGS: aluminum alloy, refining furnace, vacuum furnace, vacuum pump, metal purification, vacuum refining/VRP-1 vacuum furnace, VDK-1 vacuum furnace, VNO-6 vacuum pump, VNO-HO vacuum pump, VPP-1 vacuum pump

ABSTRACT: The use of fluxes, chloride salts, gaseous chlorine and other active and inert gases in purification of aluminum alloys to remove nonmetallic inclusions (gases and oxides) is not sufficient to produce alloys of the required purity. The VRP-1 vacuum electric distributing furnace has been developed for vacuum-refining aluminum alloys to improve aluminum alloy casting technology. The new design and construction of the furnace make it possible to purify the alloy at a residual pressure of 1-10 mm Hg and to heat the metal independently of the duration of the vacuum treatment cycle. After the gases are pumped out, the melt is held in the 730-760°C range for 10-15 minutes. Helical resistance coils are used for heating the furnace. Vacuum rubber gaskets are used for hermetically sealing the steel housing with its water-cooled cover. Technical data for the VRP-1 furnace: 300 kg crucible capacity; 20-min vacuum treatment cycle; 50 kw

Card 1/2

UDC: 66.067.669.715

ACC NR: AP6016903

power consumption; vacuum pump capacities 18 ℓ/sec (VNO-MG pump) and 97 ℓ/sec (VNO-6 pump); the unit is 1250 mm in diameter and 950 mm high. A second furnace with gas heating, the VDK-1, has also been developed for refining aluminum alloys. This unit consists of a vacuum chamber, vacuum gauges, pumps, a receiver and gas burners. The mixer of the vacuum chamber is lined with firebrick. Deflectors are fastened to the vacuum rubber gaskets used for hermetically sealing the cover to prevent heat losses at this point. The charge is heated to 760°C by injection heaters which receive gas through a pipeline fastened to a hinge mechanism. Techni- cal data for the VDK-1 furnace: 1500 kg mixer capacity; 12 nm3/hr capacity for a single burner; residual pressure 1-10 mm Hg; 30 min vacuum treatment cycle; vacuum pump capacities same as for the VRP-1; 12 burners; the unit is 2000 mm in diameter and 1500 mm high. A single vacuum unit in the plant may be used to accomodate the VRP-1 line. The new refining methods and equipment have meant a savings of 20,000 rubles per year in a single aluminum foundry. Furnaces for refining alumi- num alloys are on display in the "Metallurgiya" pavilion at the Exhibition of Achievements of the National Economy USSR. [JPRS]

SUB CODE: 11, 13 / SUBM DATE: none

Card 2/2   BhG

L 45881-66   EWT(m)/EWP(t)/ETI   IJP(c)   JD/WW/JW/JG/RH

ACC NR: AP6017537   (N)   SOURCE CODE: UR/0193/66/000/001/0003/0004

AUTHOR: Il'in, N. S.

ORG: None

TITLE: UChV-2A apparatus for fine purification of hydrogen

59
13

SOURCE: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 1, 1966, 3-4

TOPIC TAGS: hydrogen, palladium base alloy, gas diffusion, diffuser / UChV-2A
hydrogen purifier

ABSTRACT: A description of the UChV-2A apparatus designed and constructed by the
"Giredmet" Institute is presented. The apparatus is used as a diffuser for fine purifica-
tion of commercial hydrogen gas. For this purpose, the apparatus is equipped with a set
of preheated metal diaphragms made of palladium base alloy. The set being connected to a
pumping system is mounted in a vacuum chamber which is equipped with an electric heater.
The device is explosion proof. A protection against accidental leakage is assured by the
possibility of pumping out incoming hydrogen. The apparatus can be dismantled. The
apparatus is shown in a photo. Its size is 1000 x 700 x 1800 mm. The weight is 370 kg.
The apparatus output is rated at 1 to 1.5 cu m/hr. In this respect, it is mentioned that
it can be compared with the best devices of foreign origin. Orig. art. has: 1 photo,
1 table.

SUB CODE: 07, 14/ SUBM DATE: None

Card 1/1   JS   UDC: 66.074

IL'IN, N.S.

Using ultrasonic techniques for preventing scale formation.
Biul.tekh.ekon.inform. no.2:34-37 '62.
     (Ultrasonic waves—Industrial applications)   (MIRA 15:3)

1. KLYUCHAROV, YA. V., Prof; IL'IN, N. V., Eng.

2. USSR 600

4. Refractory Materials

7. Wear of chrome-magnesite refractories in the burning zone of rotary kilns, TSement, 18, No. 6, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

IL'IN, Nikolay Vasil'yevich

[Omsk Economic Administrative District]Omskii ekonomicheskii administrativnyi raion. Omsk, Omskoe oblastnoe knizhnoe izd-vo, 1957. 60 p.
    (Omsk Province—Economic conditions)   (MIRA 15:10)

AKOPOV, Igor' Artashesovich; BOBRISHCHEV-PUSHKIN, Dmitriy
     Mikhaylovich; PROKOF'YEVA, Anna Kuz'minichna; YATSENKO,
     Konstantin Petrovich; AL'TMAN, M.B., doktor tekhn. nauk,
     retsenzent; IL'IN, O.A., inzh., retsenzent; YAKOVLEVA,
     V.I., red.

     [Industrial safety in working with beryllium and its alloys]
     Bezopasnost' truda pri rabote s berilliem i ego splavami.
     Moskva, Izd-vo "Mashinostroenie," 1964. 106 p.   (MIRA 17:6)

KOVAL'CHUK, V.A., inzh.; IL'IN, O.B., inzh.

Compensation of the capacitive current in testing the
insulation of large electrical machines. Elek. sta. 35 no.3:
83-84 Mr '64.   (MIRA 17:6)

9.2590

39154
S/120/62/000/003/018/048
E192/E382

AUTHORS: Auslender, V.L., Il'in, O.G. and Shenderovich, A.M.

TITLE: Generation of current pulses of variable duration

PERIODICAL: Pribory i tekhnika eksperimenta, no. 3, 1962,
          81 - 83

TEXT: A method of generating current pulses of continuously
variable duration by means of a delay line is described. The
principle of the method is illustrated in Fig. 1. The forming
line is charged from a voltage source U and it is terminated by
a resistance R via a discharge device P_1 at one end and

the load-resistance Z at the other end; R is equal to the
wave impedance ρ of the line. The operation of the system is
as follows. Assuming that the load Z (either ohmic or
reactive) is small in comparison with ρ , the current flowing
across Z when P_2 is conducting is approximately equal to

U/ρ . This current flows until the instant when a negative
current wave $U/2\rho$ of negative polarity reaches the load from
the matched end of the line after triggering the device P_1 .
Card 1/2

Generation of current pulses ....

S/120/62/000/003/018/048
E192/E382

A current pulse having an amplitude U/ρ and duration equal to the transit time τ of the wave along the line is thus formed on the load. If the instant of triggering of one of the discharge devices with respect to the other is varied from 0 to $\pm\tau$, the electrical processes in the line are not changed but the duration of the current pulse at the load end of the line is varied from 0 to 2τ. There are 4 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR
               (Physicotechnical Institute of the AS UkrSSR)

SUBMITTED: November 25, 1961

Fig. 1:
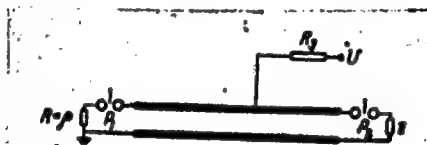
Card 2/2

AUSLENDER, V.L., GRISHAYEV, I.A., ILIN, O.G., SHENDEROVICH, A.M.

"Arrangement for acculmulation electrical system with the energy of 100 MEV."

Report submitted to the Intl. Conference on High Energy Physics and Nuclear Structure,   Geneva, Switzerland   25 Feb-2 Mar 1963

AUSLENDER, V.L., ILIN, O.O., SHENDEROVICH, A.M.

"Forming impulses in variable loading."

"Forming impulse currents of regular duration."

"Selection of optimal conditions for ø electric lead with energy of 100
MEV in acculmulation systems."

Reports submitted to the Intl. Conference on High Energy Physics and Nuclear
Structure,   Geneva, Switzerland   25 Feb-2 Mar 1963

AUSLENDER, V.L.; IL'IN, O.G.; SHENDEROVICH, A.M.

Pulse formation in a variable load. Prib. i tekh. eksp. 8 no.2:173-174
Mr-Ap '63.   (MIRA 16:4)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.
                    (Pulse techniques (Electronics))

GRISHAYEV, I.A.; IL'IN, O.G.; SHENDEROVICH, A.M.

Formation of short magnetic field pulses in a ferrite magnet.
Prib. i tekh. eksp. 8 no.4:139-141 Jl-Ag '63.   (MIRA 16:12)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

GRISHAYEV, I.A. [Hryshaiev, I.O.]; IL'IN, O.G. [Il'in, O.H.]; SHENDEROVICH,
A.M. [Shenderovych, O.M.]

Formation of short-front pulses of a magnetic field in inflector
and deflector devices. Part 1.   Ukr. fiz. zhur. 8 no.8:861-868 Ag '63.

Formation of short-front pulses of a magnetic field in inflector
and deflector devices. Part 2.   869-876   (MIRA 16:11)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.

BK

AUTHOR: Il'in, O.G.; Shenderovich, A.M.

TITLE: Investigation of the characteristics of pulsed magnets with ferromagnetic cores

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.5, 1964, 896-905

TOPIC TAGS: electromagnet, pulsed magnet, magnetic field, particle accelerator component

ABSTRACT: The magnetic field configuration of a number of two-turn pulsed electro-
magnets with ferrite cores was investigated experimentally in order to obtain data
for the design of pulsed magnets such as are employed as deflectors or inflectors
in particle accelerators. The geometry of the magnets investigated is illustrated
in Fig.1 of the Enclosure. The magnets were excited with 0.2 microsec pulses having
peak currents up to 500 A. The fields were measured with a probe extending for 3 mm
in the y and z directions (see Fig.1). An accuracy of 3% is claimed for relative
measurements of field strength, but only 15% for the absolute values. The self-in-
ductance of the magnets was measured, and the efficiency (ratio of magnetic field

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ACCESSION NR: AP4035703

energy in the uniform portion of the field to total magnetic field energy) was cal-
culated. Results are presented graphically and are discussed in some detail. The
most advantageous configuration was found to be III (figure). When the external con-
ductors were located farther from the gap, as in IV and V, the fringe field increas-
ed in magnitude and extent. When the conductors were brought inside the gap, as in
II and I, the region of uniform field decreased in size, with a resulting decrease
in efficiency. The least advantageous configuration V corresponds to that for which
N.D.Coggeshall (J.Appl.Phys.18,855,1947) has published field strength calculations.
These calculations are compared with experimental data from the present investiga-
tion and good agreement is found. Particular attention was given to configuration
of type IV, because the resulting fields decrease on both sides of the uniform field
region. The magnetic field is calculated for four conductors (two turns) located in
the gap between two infinite plane-parallel slabs of magnetic material having infin-
ite permeability. The calculated fringe field agreed with the measured field for
type IV configuration, even though the outer conductors were rather close to the
edge of the core. The calculations show that when the magnet gap is small compared
with the separation between the conductors, the field configuration becomes approxi-
mately independent of the separation, and the efficiency approaches 100%. Orig.
art.has: 11 formulas, 4 figures and 1 table.

Card 2/4

ACCESSION NR: AP4035703

ASSOCIATION: none

SUBMITTED: 30Jan63   DATE ACQ: 20May64   ENCL: 01

SUB CODE: EE, EM   NR REF SOV: 003   OTHER: 003
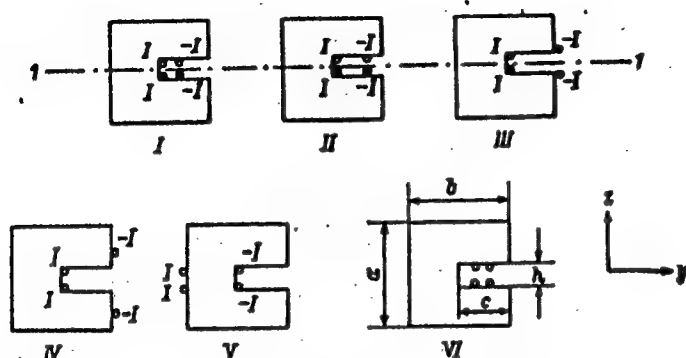
Card 3/4

Fig.1. Magnet core and conductor configurations. Dimensions: a = 7 cm, b = 6 cm, c = 3 cm, h = 1 cm.

Card 4/4

ACCESSION NR: AP4035704   S/0057/64/034/005/0906/0910

AUTHOR: Il'in, O.G.; Shenderovich, A.M.

TITLE: Investigation of the characteristics of pulsed magnets

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.5, 1964, 906-910

TOPIC TAGS: electromagnet, pulsed magnet, iron-free magnet

ABSTRACT: The magnetic field of four parallel conductors (two turns) located in the
gap between two infinite plane-parallel slabs of magnetic material having infinite
permeability is calculated by the method of images. The configuration of the system
is shown in Fig.1 of the Enclosure, which also shows the positions of the first few
images. The calculated field is compared with the field of the four conductors in
the absence of ferromagnetic material, and with the fields calculated by taking in-
to account one, two, and three of the infinite sequence of reflections. The purpose
of this comparison is to explore the possibility of employing several conductors
located at the image positions to simulate in an iron-free system the field that
would be obtained with a ferromagnetic core. It is found that the region throughout
which the field is approximately uniform is nearly as large in the iron-free case

Card 1/3

ACCESSION NR: AP4035704

employing only one or two reflections as in the presence of a ferromagnetic core,
but that the fringe field is considerably greater even when three reflections (16
conductors) are included. The efficiency (ratio of the magnetic field energy in the
uniform field region to the total magnetic field energy) is much less without a fer-
romagnetic core than with one. The magnetic fields obtained with cores of several
different ferrite materials were measured by the method described in the preceding
paper (O.G.Il'in and A.M.Shenderovich,ZhTF,34,No.5,896,1964). Core configuration III
of that paper was employed. It was found that when the permeability of the core ma-
terial was between 5 and 10, the self-inductance, maximum field strength, and effi-
ciency were intermediate between those obtained with no core and with a core of high
permeability material. Orig.art.has: 2 formulas, 4 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 30Jan63   DATE ACQ: 30May64   ENCL: 01

SUB CODE: EM   NR REF SOV: 001   OTHER: 000

Card 2/3
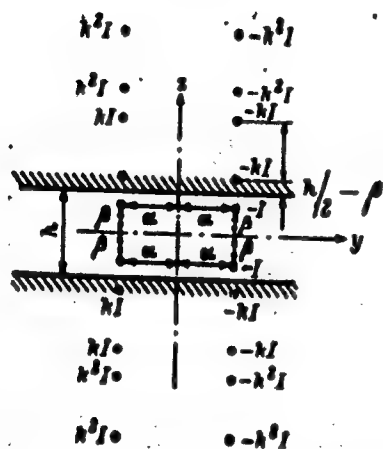
Fig.1. Configuration of conductors, magnetic material, and images.

Card 3/3

Card 3/5

IL'IN, O.G.; SHENDEROVICH, A.M.

Measurements of nonlinear inductances. Izm. tekh. no.8:55-56
Ag '65.   (MIRA 18:9)

IL'IN, O.G. [Il'in,O.H.]; SHENDEROVICH, A.M. [Shenderovych, O.M.]

Conditions for obtaining rapidly fading fields in inflector
devices. Part 2. Ukr. fiz. zhur. 10 no.9:985-989 '65.
(MIRA 18:9)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.

IL'IN, O.G.; SHENDEROVICH, A.M.

Shortening high-voltage pulse fronts with the aid of nonlinear inductivity. Prib. i tekh. eksp. 10 no.1:112-113 Ja- '65.   (MIRA 18:7)

L 23620-66   EWT(1)/EWA(h)

ACC NR: AP6009515   (A)   SOURCE CODE: UR/0413/66/000/005/0034/0035

. 56
B

AUTHOR: Il'in, O. G.; Shenderovich, A. M.

ORG: none

25

TITLE: A device for shortening the trailing edge of high voltage pulses. Class 21,
No. 179357 [announced by Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy
institut AN UkrSSR)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 5, 1966, 34-35

TOPIC TAGS: pulse generator, pulse shape, pulse compression

ABSTRACT: This Author's Certificate introduces a device for shortening the trailing
edge of high voltage pulses. Multiple reflections are eliminated when the load is a
reactance or a mismatched resistance by connecting a three-electrode discharger and an
inductance in parallel with each other and in series with the load. A symmetric delay
line is connected to the electrodes of the discharger.

UDC: 621.374.027.3

Card 1/2

L 23620-66

ACC NR: AP6009515   O
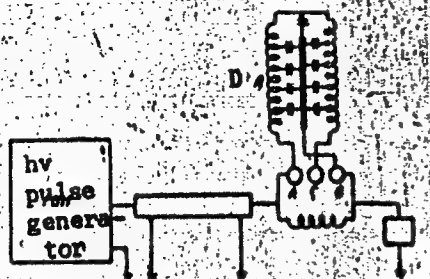
A, B, C--discharger electrodes; L--induc-
tance; D--delay line

SUB CODE: 09/   SUBM DATE: 13Nov64/   ORIG REF: 000/   OTH REF: 000

Card 2/2

L 41700-66

ACC NR: AP6019585   SOURCE CODE: UR/0115/66/000/004/0090/0091

AUTHOR: Il'in, O. G.; Shenderovich, A. M.

ORG: none

TITLE: Oscillography of magnetic-field pulses

SOURCE: Izmeritel'naya tekhnika, no. 4, 1966, 90-91

TOPIC TAGS: magnetic field measurement, oscilloscope, electron beam, time signal/
OK-19M oscilloscope

ABSTRACT: The described method is based on direct action of the measured field on
the oscilloscope beam, and is free of the distortion introduced by the intermediate
elements (amplifiers) used in other methods. The magnetic field is oriented in the
horizontal sweep direction, and time pips are superimposed on the measured pulse.
Any distortion inherent in the sweep circuit produces an equal effect on the time
pips, so that the measuring accuracy depends only on the pip repetition frequency.
The method was tested with an OK-19M oscilloscope and used to measure a magnetic-
winding current pulse of 2000 a and 0.1 μsec duration (field of several hundred Oe).
The required deflection of the oscilloscope beam was obtained with the CRT placed
10-15 cm from the magnet. The method can also be used with arbitrary tube inclina-
tion relative to the magnetic force lines. Orig. art. has: 1 figure.

SUB CODE: 14, 20/   SUBM DATE: 00

Card 1/1   UDC: 621.317.351: 621.317.42

ACC NR: AP6022030   (N)   SOURCE CODE: UR/0120/66/000/003/0192/0194

AUTHOR: Il'in, O. G.; Shenderovich, A. M.

ORG: Physico-Technical Institute, AN UkrSSR, Khar'kov (Fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: Characteristics of pulsed ferrite magnets with large magnetizing currents and under conditions of external constant magnetic fields

SOURCE: Pribory i tekhnika eksperimenta, no. 3, 1966, 192-194

TOPIC TAGS: pulsed magnetic field, ferrite, magnetic field intensity, external magnetic field

ABSTRACT: This investigation examines the effect of core saturation on the magnitude and distribution of the pulsed field in a ferrite magnet. The pulse time was 0.1 microsecond. The dependence of the field in the gap upon the magnetizing current is graphed. With the windings inside the ferrite magnet gap, it is possible to attain pulse fields of approximately 7 kilooersted. It was found that the distribution of the magnetic field at 7 kilooersted differed very little from the distribution obtained at low magnetizing current. The performance of the ferrite magnets under conditions of constant external magnetic field is shown in figure 2. In any configuration, the ferrite MNTS-120, which has a large saturation inductance, possesses better characteris-
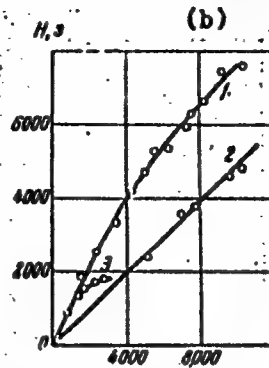
UDC: 621.318.3

Card 1/3

L 06409-67

ACC NR: AP6022030

(a)

(b)
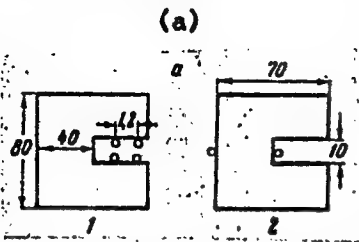
Fig. 1. a--configuration of windings; b--magnetization curves for the pulsed magnet. 1--ferrite PH$_2$-400, winding configuration 1; 2--nonferrous magnet, winding configuration 1; 3--ferrite PH$_2$-400, winding configuration 2.

Fig. 2. Dependence of the pulsed field in gap of a ferrite magnet upon constant magnetizing field. The positive direction of the abscissa corresponds to identical direction of constant and pulsed field in core. Pulsed magnetizing current is equal to 5000 amp. I--ferrite MNTS-120; II--ferrite PH$_2$-400; 1--configuration 1 (fig. 1,a); 2--configuration 2.

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ACC NR: AP6022030

tics than the ferrite PH₂-400. In configuration (1) the field intensity is not re-
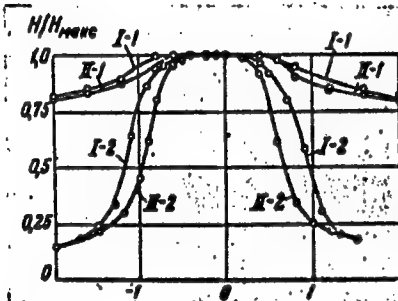duced by the presence of an external constant magnetic field of any polarity up to 1
kilooersted. Curves I-1 and II-1 practically do not change with an increase in the
pulse magnetizing current up to 1500 amp. An external constant magnetic field inten-
sity up to 1 kilooersted has practically no effect upon the operation and distribution
of the ferrite magnetic field. With further increase in the external constant magnetic
field the distribution of the pulsed field largely approximates that in a nonferrous
magnet. Orig. art. has: 3 figures.

SUB CODE: 20/   SUBM DATE: 17Sep64/   ORIG REF: 002/   OTH REF: 001

Card 3/3

L 09352-67   EWT(m)/EWP(t)/ETI   IJP(c)   JD

ACC NR: AP6031314   SOURCE CODE: UR/0185/66/011/007/0730/0738

AUTHOR: Il'yin, O. H. - Il'in, O. G.; Shenderovych, O. M. - Shenderovich, A. M.

ORG: Physicotechnical Institute, AN UkrSSR, Khar'kov (Fizyko-tekhnichnyy instytut AN URSR)

TITLE: Concerning the passage of strong waves in lines through a lumped inhomogeneity with a ferrite

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 11, no. 7, 1966, 730-738

TOPIC TAGS: nanosecond pulse, pulse shape, ferrite, transmission line, magnetization, F-1000 ferrite, F-400 ferrite

ABSTRACT: This is a continuation of earlier work by the authors (PTE no. 1, 112, 1965), where it was experimentally demonstrated that the fronts of high-voltage nanosecond pulses can be made steeper with the aid of nonlinear inductances. Inasmuch as an earlier analysis of this phenomenon (by G. A. Mesyats and R. B. Baksht, ZhTF v. 35, no. 5, 889, 1965) using the Landau and Lifshits equations was limited to the case when the magnetic vector rotates without change in absolute magnitude, and is therefore not applicable to ferrites, the authors present an analysis, based on the modified Bloch equation, which takes into account the change of the magnetization in both magnitude and direction. The analysis yields a differential equation for the

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L 09352-67

ACC NR: AP6031314   -/

output voltage of a nonlinear inductance; this equation is integrated for the case of
a piecewise linear static magnetization curve. The results were checked experimen-
tally by passing pulses of magnetic, with amplitudes up to 100 Oe (current pulse am-
plitude 50 - 100 A) through ferrites (F-1000 and F-400). The tests show that by suit-
able choice of parameters the results of the calculations can be reconciled with the
experimental data. Measurements over a larger range of voltages are necessary to de-
termine whether the Bloch equations or the Landau and Lifshits equations are more
suitable. The authors thank G. A. Mesyats for a discussion of the results. Orig.
art. has: 5 figures, 16 formulas, and 1 table.

SUB CODE: 20, 09/ SUBM DATE: 28Jul65/ ORIG REF: 005/ OTH REF: 003

Card 2/2 mł

ACC NR: AP6022027   SOURCE CODE: UR/0120/66/000/003/0185/0187

AUTHOR: Il'in, O. G.; Shenderovich, A. M.

ORG: Physico-Technical Institute, AN UkrSSR, Khar'kov (Fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: Pulse magnets with an open magnetic path

SOURCE: Pribory i tekhnika eksperimenta, no. 3, 1966, 185-187

TOPIC TAGS: magnetic circuit, magnetic core, ferrite, pulsed magnetic field

ABSTRACT: The characteristics of pulse ferrite magnets with open magnetic paths are investigated to show that even when the dimensions and the thickness of ferrite plates are small the field is very homogeneous and is substantially stronger in value compared with the field produced by a magnet of the same construction without a core. Measurements were conducted by discharging a 0.011 µf capacitor through the winding of a magnet. The oscillation period was approximately 1 microsecond. The current through the winding was measured by integrating the voltage across an inductance connected in series and having a value of 0.45 microhenries. The magnetic field was measured by means of the induction method. The measured voltage was fed directly to the deflection plates of an oscilloscope. Ferrite materials with a permeability of 120 and 1000 were used. Measurements were taken with small field intensities of the order of 1 kilo-

UDC: 621.318.3

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ACC NR: AP6022027

oersted which was insufficient to saturate the ferrite plates. The winding had two turns which were placed symmetrically with respect to the middle plane of the magnet. Three winding configurations were used in the measurements. The distribution of leak- age fields did not differ appreciably from that of coreless magnets. It was concluded that an increase in the thickness and length of the plates is of little advantage be- cause the associated increase in the field and the changes in the leakage fields are very small. The leakage field remains substantially greater than for magnets with a closed path. Orig. art. has: 4 figures, 2 tables.

SUB CODE: 20,09,11/   SUBM DATE: 12Nov64/   ORIG REF: 001

Card 2/2

IL'IN, O.P., kandidat tekhnicheskikh nauk.

Selecting the gear ratio of an electric drive reductor in accordance with a given speed diagram of the mechanism. Elektrichestvo no.10:28-31 O '53.

(MLRA 6:10)

1. Sredneaziatskiy politekhnicheskiy institut.   (Electric driving)

S. —e.

S/167/59/000/006/001/002
A110/A029

13.2000

AUTHOR: Ankhimyuk, V. L.; Il'in, O. P.

TITLE: The Synthesis of Correcting Devices of Dynamoelectric Control
Systems

PERIODICAL: Izvestiya Akademii nauk Uzbekskoy SSR, 1959, No. 6, pp. 5-19.

TEXT: The modern control systems show frequently, as a consequence
of different known factors, inadmissible oscillations. Therefore, the
automatic control systems need correcting, i.e., stabilizing devices. The
control system is composed of basic devices: devices for the given working
conditions, and the correcting devices for improving the quality of transi-
tion processes. The computation of correcting devices, choosing of means
of stabilization, of parameters and of the place where the stabilizing cir-
cuit is to be connected, which is combined with the calculation of the
transition processes of a system under actual working conditions, is a
cumbersome and complex task and does not permit an optimum solution to be
found. The basic problem of the synthesis is to find easier methods of
calculation. In the literature some methods are cited (Refs. 2, 3). The

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S/167/59/000/006/001/002
A110/A029

The Synthesis of Correcting Devices of Dynamoelectric Control Systems

article describes a technical method of a synthesis of correcting devices, which can be used when designing different control systems with one stabilization circuit. The designing of a correcting device consists of the determination, at a required quality of the control system, of the amplification factor and the timing constant of the stabilization circuit, of the place of connection and the choice of the means of stabilization. Criterions for the quality of the control system are: 1) duration of the transition process, 2) value of the conversion, 3) oscillation, 4) value of retarding torque and 5) statical deflection. The duration of the transition process is characterized by the equation

$$t_{trans} = \frac{3 \text{ to } 4}{p_{min}} \qquad (1)$$

where p_{min} is the value of the least real component of the complex solution of the characteristic equation (Ref. 1). The value of the conversion is determinable after the solution of the differential equation of the system. A minimum value is to be guaranteed. The oscillation appears as the ratio between the imaginary (ω) and the real (α) component of the

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The Synthesis of Correcting Devices of Dynamoelectric Control Systems

complex solution : $k = \omega/\lambda$ (2). The correcting device has to guarantee the
least oscillation. The retarding torque originates in the conversion, being
accompanied by the slowing down of the motor, which can lead to mechanical
shocks in the transmission system (Ref. 4). The correcting device has to
limit the retarding torque. Notice is to be taken of the idling. - The
suggested method results in the setting up of a field of solutions in the
plane of the sought parameters. This leads to the location of the optimum
parameters (amplification factor and timing constant) of the stabilizing
circuit. The amount of the conversion and of the retarding torque is deter-
mined by computation of the transition process, at chosen values of the
parameters and given initial conditions. After the description of the method
a general computation of a stabilizing circuit is carried out as an example
of the application of this method. Differential equations are set up, which
are solved and discussed. The setting up of the field of solutions is ex-
plained; a sequence of 5 points is to be obeyed. After this theoretical
treatment a numerical example is given: a slabbing mill (Fig. 1) with two
motors, connected in series. Each motor has a capacity of 150 kw, the
generator 500 kw. Figs. 2-7 are representations of the functions and belong

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The Synthesis of Correcting Devices of Dynamoelectric Control Systems

to this detailed numerical calculation. Fig. 8 shows the curves of the transition processes at different means of stabilization as an illustration of the discussion of different stabilization methods. Correction by the generator tension is, for this special case, found to be the best method. There are 8 figures, 3 lists and 4 Soviet references.

ASSOCIATION: Sredneaziatskiy politekhnicheskiy institut ([Soviet] Central ...al Institute)

SUBMITTED: July 7, 1959

Card 4/4

ANKHIMYUK, V.L., kand.tekhn.nauk, dotsent; IL'IN, O.P., kand.tekhn. nauk, dotsent

Selection of the power rating of an asynchronous motor in choke controlled drives. Elektrichestvo no.4:39-42 Ap '61.
(MIRA 14:8)

1. Belorusskiy politekhnicheskiy institut (for Ankhimyuk).
2. Sredneaziatskiy politekhnicheskiy institut (for Il'in).
(Electric motors, Induction)
(Electric driving)

IL'IN, O P.

27097
S/167/61/000/004/001/002
D221/D304

16.8000 (1031, 1124, 1068)

AUTHOR: Il'yin, O.P.

TITLE: Application of splitting the stability area in
               elementary areas in calculating systems with automa-
               tic regulation

PERIODICAL: Akademiya nauk UzSSR. Izvestiya. Energetika i avtoma-
               tika, no. 4, 1961, 24 - 31

TEXT: The author analyzes stability conditions of a system having
a characteristic equation in the form of a fourth degree polyno-
mial. The latter is transformed into a product of factors and the
constants are determined. The area of stability is then divided
into elementary zones. The above method is illustrated by calcula-
ting parameters of a control system with a brake dynamometer while
chopping-off the current and voltage. The author states that the
most important quality factor of a transient regulation process is
its duration which is determined in the first approximation from

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S/187/61/000/004/001/002
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Application of splitting ...

the expression

$$t_{first} = \frac{3 \div 4}{\delta} \qquad (1)$$

where δ is the least of the absolute values if the real part of
roots of the characteristic equation of a system. It follows that
to satisfy (1) the magnitude δ should be a maximum. The parameters
satisfying this condition are found from the zones of stability
having a given degree of stability with respect to δ. V.V. Bulga-
kov (Ref. 1: Kolebaniya (Oscillations) M. Gostekhizdat, 1954)
tackled this problem previously. The author, after substitutions,
obtains

$$p^4 + A_1' p^3 + A_2' p^2 + A_3' p + A_4' = 0 \qquad (6)$$

which represents a characteristic equation of a regulation system.
By construction of a stability graph for this system, for the assu-
med values of roots having their real parts less than zero, it is
possible to select an area with the real parts of the roots less

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Application of splitting ...

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than zero. This area represents one of stability with the chosen degree equal to δ. With an increase of δ, the stability area shrinks and at a value δ limit becomes a point. When the parameters of the system are selected so that they correspond to this point of the auxiliary system at $\delta = \delta_{limit}$ then the initial system has a maximum possible stability, and, moreover, the fastest response. This method is a generalization of an earlier method of constructing the field of roots by V.L. Ankhimyuk and O.P. Il'yin (Ref. 2: Izv. AN UzSSR, Ser. tekhn. nauk, 1959, no. 6). The author gives an example of applying the above method followed by calculating the parameters of a stabilizing system of control with a brake dynamometer, shown in Fig. 1. This system contains a chopping of current and of voltage; thus its differential equation has different numerical coefficients for different parts of the transient period. The worst condition for stability takes place during a reverse voltage link at the moment when the winding of the current negative link is idle. The differential equation for a no-load start of the motor has a form

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Application of splitting ...

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$$\frac{d^4n}{dt^4} + (a_1 + a_c + a_2 \beta_c)\frac{d^3n}{dt^3} + (a_2 + a_1 a_c + a_4 \beta_c)\frac{d^2n}{dt^2} +$$

(8)

$$+ (a_3 + a_2 a_c + a_3 \beta_c)\frac{dn}{dt} + a_5 a_c n = \frac{\beta_1 U_1 + \beta_2 U_{oтc}}{C_e} a_3 a_c ;$$

as shown in (Ref. 2: Op.cit.) where β_c, α_c – are unknown parameters of a stabilizing system, β_c – the amplification coefficient, $\alpha_c = \frac{1}{T_c}$ the damping constant; $\alpha_2 = \frac{1}{T_2}$ = inverse of the time constant of the transverse circuit of the controlled motor; γ – coefficient determining which part of the generated voltage is used for the comparison; U_1, $U_{oтc} = U_{chopping}$ – voltages of the making and chopping of windings. Coefficients a_1, a_2, a_3, a_4, a_5 are

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Application of splitting ...

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found from the expressions

$$a_1 = \frac{1}{T_3} + \frac{1}{T_6} + \frac{1}{\theta},$$

$$a_2 = \frac{1 + \gamma \beta_n k_2}{T_3 T_6} + \frac{1}{T_6 \theta} + \frac{1}{T_3 \theta},$$

$$a_3 = \frac{1}{T_3 T_6 \theta},$$

$$a_4 = \frac{T_6 + \theta}{T_6 T_3 \theta},$$

$$a_5 = \frac{1 + \gamma \beta_n}{T_3 T_6 \theta},$$

where T_3 – electromagnetic time constant of the generated field, θ – electromechanical time constant of the drive;

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Application of splitting ...

$k_2 = \dfrac{R_2}{R_0}$ = resistance ratio of the motor to the total resistance of the main circuit motor generator. Detailed calculations are given in the article for a driving system having a motor, $P_H = 150$ kW, $U_H = 220$ V, $I_H = 760$ amps; $k_H = 375$ rpm, a generator $P_H = 500$ kW, $U_H = 600$ V, $I_H = 834$ amps., with the time constant $T_2 = 0.22$, $T_3 = 2.2$, $\theta = 0.0716$. There are 3 figures, 1 table and 2 Soviet-bloc references.

ASSOCIATION: Sredneaziatskiy politekhnicheskiy institut (Central Asian Institute)

SUBMITTED: February 14, 1961

Card 6/7

ANKHIMYUK, V.L., kand.tekhn.nauk, dotsent; IL'IN, O.P., kand.tekhn.nauk,
    dotsent; SHEYNA, G.P., inzh.

    Amplidyne amplifier as an element of an automatic control system.
    Izv. vys. ucheb. zav.; energ. 7 no.3:44-52 Mr '64. (MIRA 17:4)

    1. Belorusskiy politekhnicheskiy institut. Predstavlena
    kafedroy elektricheskikh mashin i elektroprivoda.

IL'IN, Oleg Pavlovich; KUZ'MICHENKO, G.A., red.; TETERINA, L.N., red.

[Program control of machine tools] Programmnoe upravle-
nie metallorezhushchimi stankami. Minsk, Vysshaia shkola,
1964. 109 p.   (MIRA 18:3)

ANKHIMYUK, Vyacheslav Leont'yevich, kand. tekhn. nauk, dotsent;
IL'IN, Oleg Pavlovich, kand. tekhn. nauk, dotsent

Analysis of feedback systems in automated electric drives.
Izv. vys. ucheb. zav.; elektromekh. 8 no.4:441-449 '65.
(MIRA 18:5)

1. Kafedra elektricheskikh mashih i elektroprivoda Belorusskogo
politekhnicheskogo instituta (for Ankhimyuk). 2. Belorusskiy
politekhnicheskiy institut (for Il'in).

IL'IN, O.P., kand. tekhn. nauk, dotsent; SATSUKEVICH, M.F., inzh.

"Electrical equipment and automatic systems of machine tools."
by I.V.Kharizomenov. Reviewed by O.P.Il'in and M.F.Satsukevich.
Izv. vys. ucheb. zav.; energ. 8 no.6:115-117 Je '65.   (MIRA 18:7)

1. Belorusskiy politekhnicheskiy institut.